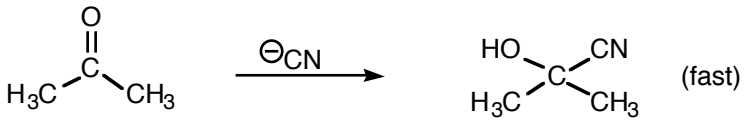
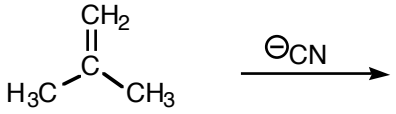
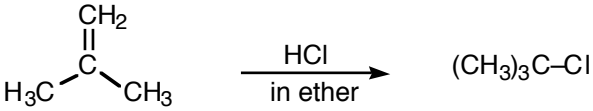
Names: _____
Chem 227/ Dr. Rusay

Aldehydes and Ketones: Synthesis and Nucleophilic Additions

1. Identify the nucleophile and the electrophile for each reaction and briefly explain why reaction B does not react but A and C do.

A 

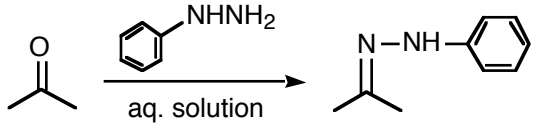
B 

C 

	nucleophile	*electrophile*	*explanation:*
A			
B			
C			

2. Write detailed electron-pushing mechanisms that explain the stated observations.

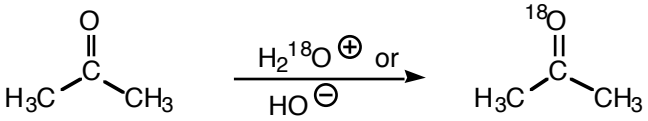
a. The following reaction occurs rapidly at pH = 5 but fails at pH = 1.



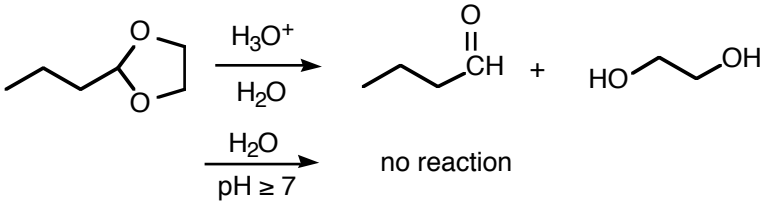
pH = 5

pH = 1

b. The labeling of acetone with ^{18}O is catalyzed by both acid and base.



c.



3. Propose structures for the lettered compounds.

Compound **A**, $C_9H_{12}O$, was optically active, did not give a precipitate with 2,4-dinitrophenylhydrazine [indicates that it is not an aldehyde or ketone], showed a broad IR band at 3400 cm^{-1}, and was readily oxidized to **B**, $C_9H_{10}O$, with aqueous chromic acid (H_2CrO_4) at room temperature. When **A** was refluxed with chromic acid, benzoic acid was obtained. Compound **B** showed strong IR absorption at 1670 cm^{-1} but none at 3400 cm^{-1} and reacted with 2,4-dinitrophenylhydrazine reagent to give **C**. When **B** was reacted with EtMgBr followed by aqueous workup, compound **D** was obtained. **D** did not react with chromic acid reagent at room temperature and showed an IR band at 3400 cm^{-1}. **B** and **D** were optically inactive and could not be resolved.

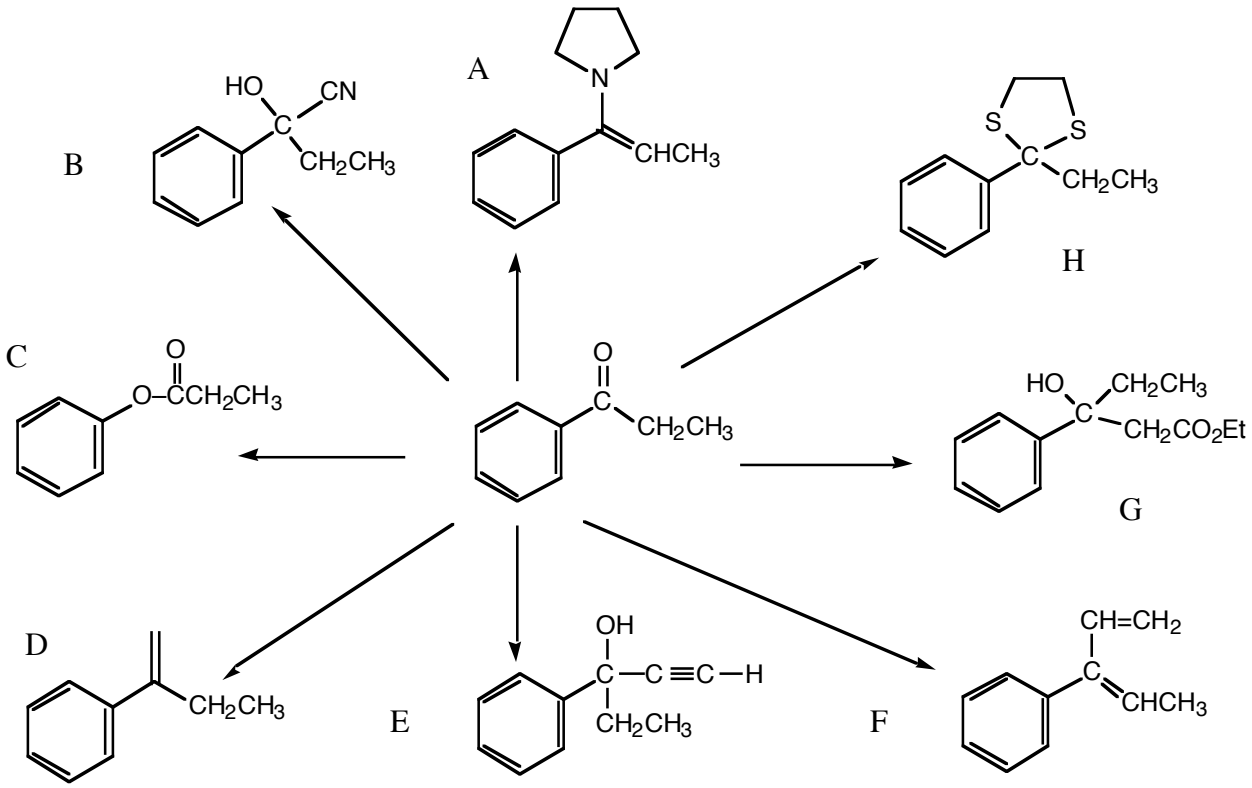
A

B

C

D

4. Show how to carry out the following syntheses using any necessary organic and inorganic reagents. More than one step may be required.



A	
B	
C	

D	
E	
F	
G	
H	